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JESS REPORT ON MALARIA ENDEMICITY IN THE LOWER JUBBA REGION

JESS Report No. 29

Prepared by:

Marian Warsame Yusuf, Ph.D.
Associates in Rural Development, Inc.
P.O. Box 1397
Burlington, VT 05402
U.S.A.
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CONTENTS

Preface		i
I.	Introduction	1
II.	Methods	2
III.	Conclusions	5
IV.	Recommendations	8

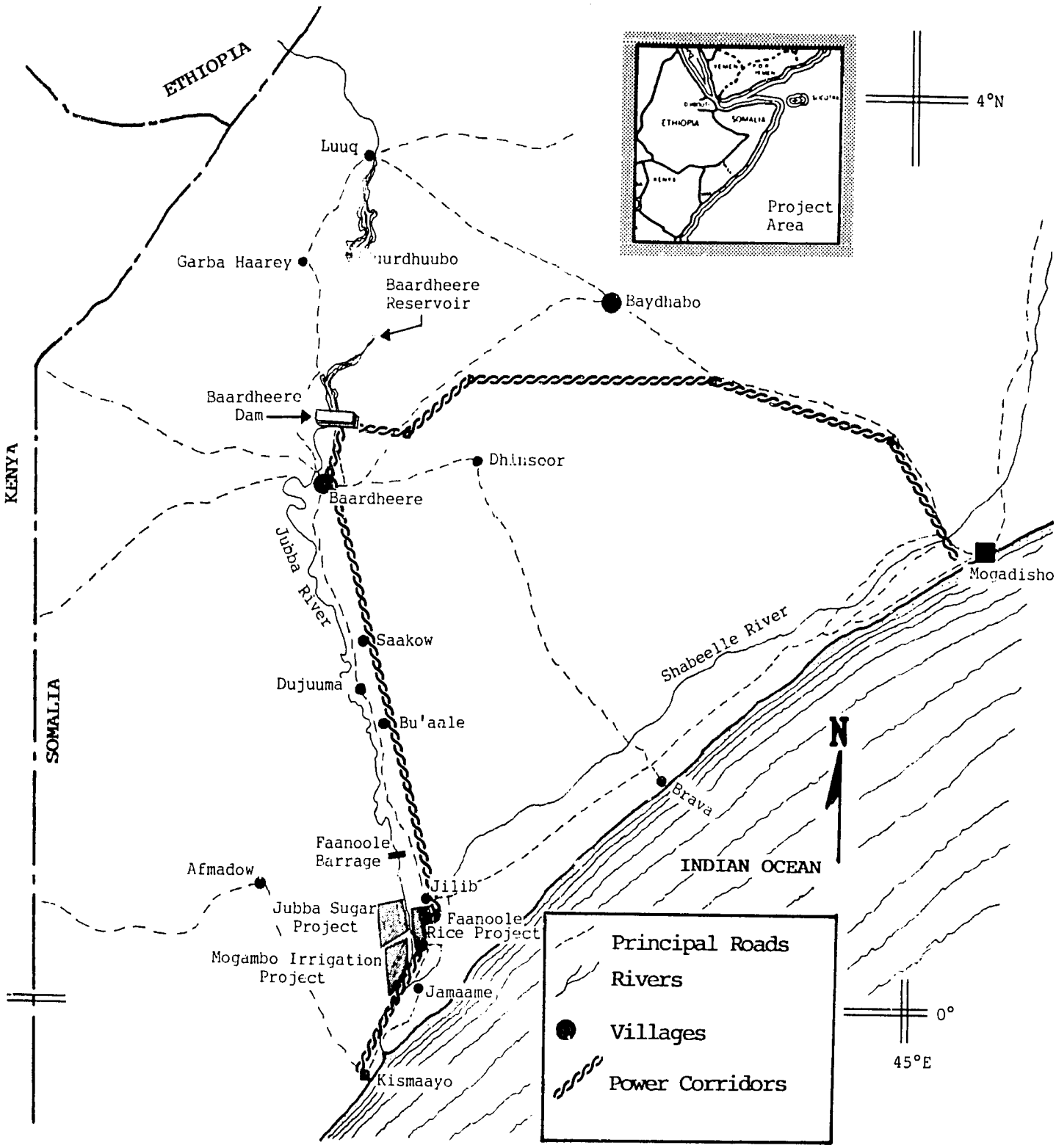
PREFACE

The Jubba Environmental and Socioeconomic Studies (JESS) are a three-year program of river-basin investigations in southern Somalia. JESS is part of a larger project, Jubba Development Analytical Studies (JuDAS), which is a cooperative effort between the U. S. Agency for International Development (AID) and the Ministry of Jubba Valley Development (MJVD) of the Government of the Somali Democratic Republic (GSDR). Associates in Rural Development, Inc. (ARD) was awarded a contract by AID (AFR-0134-C-00-5047-00) to provide technical assistance and project management for JESS.

This report presents the results of an epidemiological survey on malaria endemicity in the Lower Jubba Region carried out from 20 December 1987 to 10 January 1988. The study was sponsored by AID and MJVD through JESS. It was coordinated by Dr. Marian Warsame Yusuf, who is on the Faculty of Medicine at Somali National University. The National Anti-Malaria Service (NAS) together with the World Health Organization (WHO) representative for malaria participated actively in the planning phase and also provided technical assistance.

The author wishes to express her grateful acknowledgment to Dr. Farid, WHO regional adviser on malaria, for his most sincere and open suggestions and advice during his visit to Somalia; and to Dr. A. A. Siad, Director of the National Anti-Malaria Service, Ministry of Health, for his great cooperation, understanding and friendly responsiveness. For their understanding and cooperation, thanks are acknowledged to Dr. M. A. Barzger, WHO representative in Mogadisho, and to Dr. Lindgren, WHO expert in maternal and child health (MCH). Last but not least is Dr. Ralph K. Klumpp, with whom were shared all the difficulties and obstacles during our fieldwork.

Figure 1. Area of the Baardheere Dam Project and the Jubba Valley Development



I. INTRODUCTION

Malaria is one of the most important tropical diseases in Somalia, where the entire population is exposed to the disease. Real epidemiological data on malaria endemicity in the different ecological strata are lacking. The extent of the problem can be estimated only through analysis of data obtained by passive case detection (fever cases referred to the laboratories) and, sometimes, by active case detection (search for the fever cases) by Malaria Station personnel.

The Malaria Station in the Lower Jubba Region is located in Jamaame, where basic facilities for malaria diagnosis and treatment are available. However, only villages close to the station can take advantage of this service.

The economy of the country is based on agriculture and livestock, and, therefore, development priority has been given to agricultural projects. The Lower Jubba is an agriculturally fertile area and a primary focus for agricultural development in the country. Agricultural extension programs have just been established and the potential for further agricultural extension exists. There are many irrigation projects in operation, and new crops, such as rice, are being introduced. This is resulting in an influx of laborers into the area.

Previous experience has shown that, as the area of land involved in large-scale irrigation increases, the potential for adverse environmental health effects increases proportionally. Consequently, the pattern of water-borne diseases, such as schistosomiasis (bilharzia) and malaria, changes with the development of water-related projects. This is a threat to both the indigenous population and the immigrant workers, who are less immune. Therefore, it is essential to investigate the health situation before additional large water-related projects are implemented. The purpose of this study was to provide baseline data on malaria endimicity in the Lower Jubba Region for comparison with the post-project results.

The malaria survey was conducted in parallel with the JESS bilharzia study.

II. METHODS

The malaria study was conducted by one parasitology and one entomology team of seven and five technicians respectively. Two microscopists from Jilib and two from Jamaame and their microscopes were made available to the survey. A field malaria laboratory was set up at the camp where daily laboratory work was done (staining and microscopy). Health officials at regional and district levels and district political leaders were informed upon the teams' arrival. The village leaders and teachers were informed in advance of each day's work.

The following definitions were used in conjunction with this study:

- parasite rate--percentage having detectable parasitaemia;
- parasite density (mean parasite density)--geometrical mean of individual parasite counts;
- spleen rate--percentage having enlarged spleens; and
- average enlarged spleen (AES)--mean of size of palpable spleens not including spleens classified as zero.

WHO classifies the degree of malaria endemicity on the basis of spleen rates as follows:

- hypoendemic--spleen rate of less than 10 percent in children (two to nine years of age);
- mesoendemic--spleen rate between 11 percent and 50 percent in children (two to nine years of age);
- hyperendemic--spleen rate in children (two to nine years of age) greater than 50 percent and in adults greater than 25 percent; and
- holoendemic--spleen rate in children (two to nine years of age) constantly greater than 75 percent, with high spleen rate in adults.

The same classification is used with parasite rate as the basis. The spleen rate is more constant in time because of the fluctuating nature of parasitaemia. Therefore, spleen rate indicates period prevalence (experience of the disease over a longer period) while parasite rate indicates point prevalence (at the point in time of sampling).

The study area consisted of seven beels (village centers) and 73 villages in the Lower Jubba Region. Two beels and eight villages (at least one village from each beel) were randomly selected. All but two of the villages fringe the river. The main occupation is agriculture, by subsistence farming and/or working on the big plantations. The main source of water is from the river and channels, although there is at least one well for every village.

The total population in the study area has been estimated at 83,000 (JESS). Ten percent of the children between two and nine years of age in the finite population were studied. The actual sample size was 1,246. In Jamaame and Bangeeni, schoolchildren (Koranic and primary) were studied. In the rest of the villages parents were asked to bring the children to the selected test sites.

The name of each village and the name, sex, age and personal background of each examined child were recorded by the team. Splenic enlargement was identified, and spleen size was estimated with the child in a standing position. The spleen rate and the degree of enlargement were also measured (Figure 2).

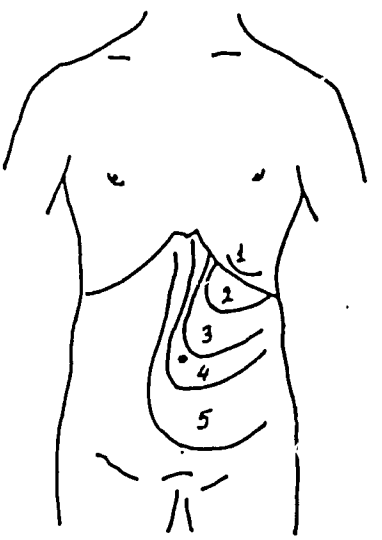


Figure 2. Classification of Spleen Sizes According to Hackett's Method (WHO, 1963, Terminology of Malaria).

Blood films, thick and thin, were taken by finger pricks and transported to the field laboratory (under trees) where they were Giemsa-stained the next morning. Both parasite species and density were determined. Positive cases were treated over a three-day period with a full therapeutic dose of chloroquine (25 milligrams bese per kilogram of body weight) starting the afternoon following diagnosis. Adults and younger children complaining of malaria symptoms were examined for malaria parasites and treated if they were positive.

III. CONCLUSIONS

Of the 1,246 children between two and nine years of age examined for enlarged spleen, 180 (14.4 percent) had palpable spleens. According to Hackett's classification, 21 children had spleen size corresponding to grade I; 82 to grade II; 63 to grade III; and 14 to grade IV. The average enlarged spleen was calculated to be 2.38. The spleen rates of children from various villages were significantly different, implying a different degree of malaria endemicity. Hence, it is important to present the findings of each village separately (Table 1).

The highest spleen rate (52.2 percent) was found in Buulo Maamow, while the lowest rates were encountered in Jamaame, Bangeeni, Beled Raxma and Nafta Quur, indicating hyperendemic malaria in the first site and a hypoendemic situation in the second. The remaining villages, Mana-Moofa, Malaayleey, Beled Amiin and Janaale Jaay, showed mesoendemic transmission.

Similarly, the highest parasite rate (50.7 percent) was found in Buulo Maamow, supporting the finding that the disease is hyperendemic in the village. Table 2 shows the parasite rates, parasite densities and species in the different villages. The dominant species was Plasmodium falciparum. P. malariae, the only other species detected, was found in four villages, with the highest rate (14.3 percent) at Malaayleey. An average of 20.7 percent of the total sample was found positive for malarial parasites.

In most of the villages, there was no significant discrepancy between spleen rate and parasite rate as far as degree of endemicity is concerned (Table 3). This strongly indicates that the splenomegaly in the children was due to malaria.

Table 1. Spleen Rates in Children Aged Two to Nine Years from the Lower Jubba Region

Village	Total Number	Spleen Rates (%)	Average Enlarged Spleen (AES)
Buulo Maamow	67	52.2	2.9
Beled Amiin	160	26.5	2.5
Malaayleey	83	20.0	2.3
Moofa	137	19.7	2.4
Beled Raxma	168	16.7	2.2
Mana Moofa	99	16.2	2.3
Nafta Quur	62	3.4	1.5
Jamaame	121	1.7	2.3
Bangeeni	117	1.7	1.5
Janaale Jaay	232	1.6	2.0

Table 2. Parasite Rates, Densities and Species in Children Aged Two to Nine Years From the Lower Jubba Region

Village	Total Number	Parasite Rates (%	Parasite Densities (asexual/ul) GM	Parasite Species Pf%	Pm%
Buulo Maamow	67	50.7	1366.3	97.1	2.9
Malaayleey	160	35.0	431.6	85.7	14.3
Beled Amiin	83	32.5	838.6	100.0	0
Moofa	137	32.1	633.1	100.0	0
Beled Raxma	168	21.4	1197.4	96.4	3.6
Mana Moofa	99	19.2	5638.9	100.0	0
Janaale Jaay	62	12.9	4215.1	90.0	10.0
Bangeeni	121	8.3	958.9	100.0	0
Nafta Quur	117	5.1	1137.0	100.0	0
Jamaame	232	3.0	2305.7	100.0	0
Total	1246				
	Avg.	20.7	1872.17	95.7	4.3

GM = geometric mean Pf = Plasmodium falciparum
Pm = Plasmodium malariae

Table 3. Spleen and Parasite Rates in the Different Villages

Village	Spleen Rate %	Parasite Rate %
Buulo Maamow	52.2	50.7
Beled Amiin	26.5	32.5
Malaayleey	20.0	35.0
Moofa	19.7	32.1
Beled Raxma	16.7	21.4
Mana Moofa	16.2	19.2
Nafta Quur	3.4	5.1
Jamaame	1.7	3.0
Bangeeni	1.7	8.3
Janaale Jaay	1.6	12.9

The difference of malariometric indices corresponds to the ecological and socioeconomic status of the villages. Villages along the river with lower socioeconomic levels had higher spleen and parasite prevalence than those far from the river and/or with a better socioeconomic status (as found in schoolchildren).

To study the entomology, live mosquitos were caught at night, with the aid of glass collecting suckers, when biting or resting indoors. They were later identified. Anopheles arabienses was found to be the important vector in the area. Nearby water collections from open wells were found to be Anophelene larval habitats. Larvae were also found in borrowpits and seepage from canals.

In summary, malaria is endemic in the lower Jubba Region. The degree of endemicity varies from hypoendemic to mesoendemic with hyperendemic pockets. Both environmental and socioeconomic status have an impact on the disease prevalence in the area.

To provide an accurate picture of malaria endemicity in this area, a complete entomological survey needs to be conducted over a longer period (one full year), particularly where seasonal fluctuation occurs.

IV. RECOMMENDATIONS

First, the hazards of malaria and other water-associated diseases and their relationship with the irrigation projects should be made known to the communities in the agricultural extension areas.

Second, a program of health education, using documentary films and group discussions, should emphasize methods by which the community can prevent the health hazards of water development projects and seek treatment if infected.

Third, all relevant health services should be provided to the communities in the project area, so that treatment of suspected malaria cases is available to all.

Fourth, full community participation should be emphasized when implementing all health service activities.

Fifth, laboratory technicians from the local health facilities should be trained in malaria microscopy.

Sixth, the concerned ministries and agencies should give the necessary support in solving the health problems in the area.

Finally, all these necessary health promotive and protective activities should be implemented within the primary health center context.